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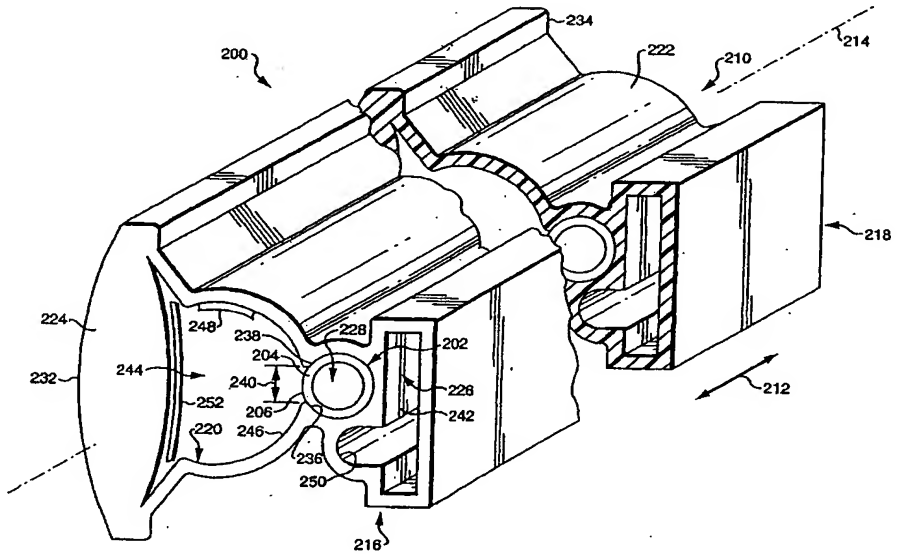

(57) Abstract: An aperture lamp assembly 2 is provided which includes a sleeve 20 which encloses an elongated lamp 8. Also included is structure for electrically connecting the lamp 8 to a power source 72. Such structure may include a housing 6 to contain lamp circuitry. Such circuitry may be in the form of ballast circuitry 6' electrically connected between the lamp 8 and the power source 72. The housing 6 is slidably attached to the sleeve 20. In one embodiment, the sleeve 20 and housing 6 are metal. A lamp housing is also provided.

WO 02/10640 A1

APERTURE LAMP, APERTURE LAMP HOUSING AND APERTURE LAMP ASSEMBLY

This application claims the benefit of Provisional Application S/N 60/222,378, filed August 1, 2000.

TECHNICAL FIELD

The present invention relates to an aperture lamp assembly which includes a sleeve, which encloses at least a portion of a lamp envelope, and a housing for circuitry. The sleeve includes a slot through which light may be emitted from the lamp. A lamp housing is also provided. The present invention is particularly useful in automotive applications.

BACKGROUND ART

There are many uses for an aperture lamp. For example, the use of aperture lamps is known in the automotive industry. One example is illustrated in U.S. patent number 5,931,565, incorporated herein by reference. This patent was granted to Flanagan, Jr. et al. and assigned to Osram Sylvania Inc., the common assignee of the present invention. Without limitation, a particular application of such an aperture lamp is a stop/brake light. One such example is the commonly known center high mount stop light which may, for example, be located in the rear window of a vehicle. Such aperture lamps are typically elongated and include a discharge lamp such as a neon lamp.

There are various types of aperture lamps. For example, it is known to provide a tubular neon lamp coated on its outside surface with a reflecting material, except for a narrow strip or aperture along the length of the tube. Light is generated within the lamp tube and reflected in a conventional manner, except in the region of the aperture. Light is emitted from the lamp only through the aperture.

Aperture lamps fabricated by coating the lamp envelope with a reflective material have several drawbacks. For

example, the coating process is an additional step in the fabrication of the aperture. Not only does this add to the cost of producing the lamp but also adds to quality control considerations, particularly when the lamp is to be used in a vehicle stop/brake light wherein it is desired to achieve uniform illumination over the length of the lamp. In addition, when assembling the aperture lamp, steps must be taken to assure that the light emitting aperture is accurately aligned with the optical axis of the lamp fixture. The aperture lamp of U.S. patent no. 5,931,565 overcomes these drawbacks.

A further concern of prior art discharge lamps, such as neon lamps of the type described herein, is that the electronics provided to operate such a lamp and the various electrical and mechanical connections to the lamp radiate undesirable electromagnetic interference (EMI).

Other concerns relate to providing an aperture lamp which may be readily customized for a particular application and may include components which are readily interchangeable. Such needs are particularly desirable in vehicular applications wherein different lamp structures, including those having reduced size and/or electrical connection capabilities are used to perform various functions, and wherein lenses having different shapes and optical characteristics, might be required.

DISCLOSURE OF THE INVENTION

It is an object of the present invention to provide an improved aperture lamp assembly.

It is another object of the present invention to obviate the disadvantages of the prior art by providing an improved aperture lamp assembly.

Another object of the present invention is to provide an

improved aperture lamp assembly which may be readily customized for a particular application and includes components which are readily interchangeable.

Yet another object of the present invention is to provide an improved aperture lamp assembly having a reduced size.

It is another object of the present invention to provide an improved aperture lamp assembly which substantially reduces EMI during lamp operation.

A further object of the present invention is to provide an improved vehicular lamp which includes the aperture lamp assembly of the present invention.

Another object of the present invention is to provide an lamp housing for use with the aperture lamp assembly of the present invention.

This invention achieves these and other objects by providing an aperture lamp assembly which includes a lamp having an axis extending in a direction. The lamp comprises an envelope extending in the direction from a first end to an opposite second end. A first electrode connection is provided which extends from the first end, and a second electrode connection is provided which extends from a second end. At least one sleeve is provided which comprises a front wall and a back wall. The front wall encloses at least a portion of the envelope and includes a slot which extends in the direction. The slot includes a width sufficient to emit light therethrough from the lamp. A housing is slidably attached to the back wall.Circuitry is contained within the housing, the circuitry being electrically connected to the lamp and electrically connectable to a power source.

BRIEF DESCRIPTION OF THE DRAWINGS

This invention may be clearly understood by reference to the attached drawings in which like reference numerals designate like parts and in which:

FIG. 1 is an exploded view of one embodiment of the aperture lamp assembly of the present invention;

FIG. 2 is a sectional view of FIG. 1 taken along lines 2-2, the end covers being omitted;

FIG. 3 is a schematic view of an aperture lamp assembly of the present invention diagrammatically illustrating attachment of the aperture lamp assembly to a vehicle window;

FIG. 4 is a partially sectioned plan view of another embodiment of an aperture lamp assembly of the present invention;

FIG. 5 is a view similar to FIG. 2 of another embodiment of the present invention, the ballast housing being omitted; and

FIG. 6 is a view similar to FIG. 2 of yet another embodiment of the present invention, the ballast housing being omitted.

MODE FOR CARRYING OUT THE INVENTION

For a better understanding of the present invention, together with other and further objects, advantages and capabilities thereof, reference is made to the following disclosure and appended claims taken in conjunction with the above-described drawings.

The embodiment of this invention which is illustrated in the drawings is particularly suited for achieving the objects of this invention. FIGS. 1 and 2 illustrates an aperture lamp

assembly 2 which comprises an aperture lamp 4 and a ballast housing 6. The aperture lamp 4 comprises an elongated lamp 8 extending in a direction 10 and having an axis 12. In the embodiment illustrated in FIG. 1, axis 12 is a straight line. In other embodiments, the axis may be curved as explained hereinafter. The elongated lamp 8 extends from end 14 to an opposite end 16. In the embodiment illustrated in FIG. 1, elongated lamp 8 comprises an envelope 18.

In the embodiment illustrated in FIG. 1, the aperture lamp 4 comprises a sleeve 20 enclosing at least a portion of the envelope 18. To this end, sleeve 20 includes a slot 22 which encloses the entire length of the envelope 18 except for segments which extend beyond the envelope at ends 14 and 16, as described herein. The sleeve 20 and slot 22 extend in direction 10. The sleeve 20 and housing 6 form an aperture lamp housing for the lamp 8.

Slot 22 has a width sufficient to emit light therethrough from elongated lamp 8, as described hereinafter. The aperture lamp assembly 2 of FIG. 1 comprises means for electrically connecting the elongated lamp 8 to an electrical power source to energize the elongated lamp as described hereinafter.

FIG. 2 illustrates a cross-section of the sleeve 20 and housing 6. Without limitation, although sleeve 20 may be extruded from metal or plastic in a conventional manner, the embodiment illustrated in FIG. 2 represents a sleeve 20 in the form of an extruded aluminum tube. As illustrated in FIG. 1, the sleeve 20 has a length measured in direction 10 slightly less than the axial length of the envelope 18 of the elongated lamp 8.

In considering the structure of the aperture lamp 4, sleeve 20 includes a front wall 24 and a back wall 26. Front wall 24 provides a lamp retention cavity comprising an inside

diameter sufficient to receive and position the elongated lamp envelope 18 relative to the sleeve 20. Such lamp retention cavity is in the form of a recess 28. Without limitation, the recess 28 has a substantially cylindrical inner wall 30 with an inside diameter, and the envelope 18 has a substantially cylindrical outer wall 32 having an outside diameter slightly less than the inside diameter of the recess. In this manner, lamp 8 may be enclosed within sleeve 20. In the embodiment illustrated in FIG. 1, the recess 28 in sleeve 20 encloses at least a portion of the length of the envelope 18.

The front wall 24 also provides the slot 22 in sleeve 20, the width 34 of the slot 22 being sufficient to emit light therethrough from elongated lamp 8. Front wall 24 also provides an aperture 36 within the sleeve 26 through which light may be projected from the lamp 8. Aperture 36 is positioned between the recess 28 and the exterior of the aperture lamp 4. In the embodiment illustrated in FIGS. 1 and 2, aperture 36 is a slot which extends axially in direction 10 from one end of the sleeve 20 to the other end. The slot includes walls 38 and 40.

The front wall 24 also provides a reflector cavity 42 having a reflective portion which provides a reflector 44. Such reflective portion may be provided by fabricating the sleeve 20 from a metal such as aluminum which provides the reflective portion. In another embodiment, the wall of the reflector cavity may be metallized or treated in some other way so that the wall is reflective or otherwise has a specular surface. In the embodiment illustrated in FIGS. 1 and 2, the reflective portion is in the form of a circular concave reflective surface which forms reflector 44. Reflector 44 reflects light, passing from the recess 28 and through slot 22 in sleeve 20, in a forward direction through the aperture 36 and away from the lamp 8. Although the surface forming reflector 44 is circular in cross-section as illustrated in

FIG. 2, some other configuration may be provided depending upon the orientation of the reflection desired. For example, rather than being circular, the surface forming reflector 44 may have a parabolic cross section.

In the embodiment illustrated in FIG. 2, the walls 38 and 40 extend at a respective angle 46, 48 relative to the center of the circular surface forming reflector 44. Angles 46, 48 are each about sixty degrees, although a narrower or broader aperture may be used. The front wall 24 may have a specular surface to maximize the amount of light projected forward if desired.

The metal sleeve in FIGS. 1 and 2 of the present invention also includes structure for attaching a lens thereto. For example, in the embodiment illustrated in FIGS. 1 and 2, a lens 50 has a slide coupling structure which mates with the front wall 24 of the metal sleeve 20. To this end, front wall 24 includes grooves 52 and 54 which extend in direction 10 from one end of the metal sleeve 20 to the opposite end. Lens 50 includes tongues 56 and 58 which extend in direction 10. Tongues 56 and 58 form tongued surfaces which mate with and slide along respective grooves 52 and 54, which form respective mating grooved surfaces, to provide a groove joint to slidably and removably attach the lens 50 to the sleeve 20. Alternatively, the lens may be provided with grooves and the metal sleeve may be provided with respective mating tongues. Any other known manner of attaching a lens to a lamp assembly may be provided if adaptable to the present invention. Each reflector 44 is positioned between the lens 50 and a slot 22 so that light emitted through slot 22 will be reflected by the reflector and through the lens.

One of the advantages of the form of lens attachment illustrated in FIGS. 1 and 2 is that standardized metal sleeves may be provided with which various interchangeable lenses

having various functional characteristics may be used. In the embodiment illustrated in FIGS. 1 and 2, lens 50 is a plastic resin body having an axial extension in direction 10 having a length equal to about the length of the sleeve 20. An example of a plastic resin is a polycarbonate material. Lens 50 may have no optical effect on the light projected from the lamp 8 and reflective surface 44, and thereby act merely as a protection for the enclosed lamp. Alternatively, the lens 50 may include a curved, faceted or other optically effective surface or surfaces to influence the projected light as in known in the art. For example, the forward face 60 of the lens 50 may include vertical curvature to provide vertical spread of the projected light and be curved in the axial direction to provide horizontal spread to the projected light.

If desired, the forward face 60' of a lens 50' may be shaped to conform with the curvature of the inside surface 62 of a vehicle window, such as the rear window 64 of a passenger vehicle as illustrated schematically in FIG. 3. In such a embodiment, the sleeve 20 may also be curved to conform to the lens in which case the axis 12' may be a curved line substantially parallel to the surface 62. Further, if desired the ballast housing 6' may be attached to the aperture lamp, as described hereinafter, and then the headliner of the vehicle may be installed to cover and thereby conceal the working part of the aperture lamp assembly. In one embodiment, the lens surface 60' will be adhesively bonded to the inside surface 62 of window 64, in a manner similar to a rearview mirror attachment, after the aperture lamp and lens have been assembled. Alternatively, the lens surface 60' may first be adhesively bonded to the inside surface 62 of window 64, and the aperture lamp may then be clipped or otherwise attached to the lens. In the embodiment illustrated in FIGS. 1 and 2, the aperture 36 and reflector cavity 42 provide a space between the lens 50 and the lamp 8. Alternatively, the lens 50 may have an input portion that extends through aperture 36 and reflector

cavity 42, and conforms with the forward facing surface 66 of the lamp 8. In such embodiment, the lens 50 receives light directly from the lamp surface 66.

In the embodiment illustrated in FIGS. 1 and 2, the elongated lamp 8 is a discharge lamp. For example, elongated lamp 8 may be a low or moderate pressure discharge lamp. For example, in one embodiment, a low pressure neon discharge lamp may be used which comprises a cylindrical envelope having an outer diameter of about 5.0 millimeters. In such an embodiment, the inner diameter of the cylindrical inner wall 30 will be slightly less than about 5.0 millimeters. Each end of such discharge lamp will have a conventional press seal through which will extend respective electrode connections connected to respective electrodes, contained within the envelope 18, in a conventional manner. For example, such electrode connections may be in the form of conventional lead wires 68 and 70 illustrated in FIG. 1. A simple 12 volt ballast circuit 6' can be fitted inside the ballast housing 6 and connected to the neon lamp to drive the lamp. Other types and sizes of lamps may be used, if desired. For example, a similarly sized rare gas lamp or a subminiature fluorescent lamp may be used.

Various means may be provided for electrically connecting the lamp to the power source. For example, in the embodiment illustrated in FIG. 1, the lamp 8 is electrically connected to a power source 72 through ballast circuit 6' located within housing 6. As noted above, although sleeve 20 may be metal or plastic or some other material, in the embodiment of FIGS. 1 and 2 sleeve 20 is represented as an extruded metal sleeve, the electrical connections provided by lead wires 68 and 70 being electrically and mechanically connected to the ballast circuit 6' through conductors 74 and 76, respectively. Ballast circuit 6' is electrically and mechanically connected to the electrical power source 72 through conductors 78 and 80 in a conventional manner. It will be obvious to those skilled in the art that if

a ballast circuit is not required, the conductors 74 and 76 may be connected in a similar manner to other circuitry contained within housing 6.

In another embodiment of the type illustrated in FIG. 4, the metal sleeve 20' may provide the electrical conductive path between one of the lead wires of the lamp and the ballast circuit contained in the ballast housing. For example, in the embodiment illustrated in FIG. 4, the ballast circuit 6" enclosed within ballast housing 6 is coupled to the power source 72 by conductors 82 and 84. The lead wire 70 of neon lamp 8 is also coupled to the ballast circuit 6". To accomplish this feature, sleeve 20' comprises a conductive metal tab 86 which is electrically and mechanically attached to respective lamp lead wires 70. To this end, tab 86 may be drilled, notched or similarly formed to provide a coupling for a lead wire 70. As a practical matter, lead wire 70 may be electrically and mechanically connected to tab 86 in any conventional manner. To complete the required circuit, the metal sleeve 20' comprises an electrical connector 88. Electrical connector 88 is in the form of respective male prong which extends from the back wall 26 of sleeve 20' and mates with a female contact 90, which is electrically coupled to the ballast circuit 6" within the ballast housing 6, to electrically and mechanically connect the metal sleeve 20' with such ballast circuitry. The electrical connector 88 is electrically coupled to the power source 72 through the ballast circuit 6" within ballast housing 6. In this manner, sleeve 20' receives electrical input from the ballast circuit 6" and conducts such supplied power to tab 86 and lead wire 70. In this embodiment, the lead wire 68 of the lamp 8 is connected to the ballast circuit 6" by a conductor 92 which is mechanically and electrically connected to the ballast circuit 6" at contact 94 and to the lead wire 68.

Without limitation, housing 6 may be metal or plastic or

some other material. However, in the embodiment illustrated in FIG. 1, the ballast housing 6 is represented as an elongated metal box attached to the back side of the aperture lamp 4. For example, housing 6 may be fabricated from aluminum. The housing 6 has sufficient volume to retain the ballast circuitry 6'. Conductors 82 and 84 are electrically and mechanically connected to the ballast circuit 6' so that the ballast circuit receives, power from the power source 72. Contacts 100 and 104 are also electrically and mechanically connected to the ballast circuit 6'. The metal housing 6 provides a substantial barrier to EMI radiation from the electronic components and related connections to the lamp.

In one embodiment of the present invention, the back wall may comprise a tongued surface and the housing may comprise a mating grooved surface whereby a tongue and groove joint is provided to slidably attach the housing to the back wall. Alternatively, the housing may comprise the tongued surface and the back wall may comprise the mating grooved surface. For example, in the embodiment illustrated in FIGS. 1 and 2, the housing 6 comprises tongued surfaces 106 which include two opposing tongues 108 and 110. Back wall 26 of sleeve 20 comprises a mating grooved surface 112 which includes opposing grooves 114 and 116 which mate with respective tongues 108 and 110 to provide a tongue and groove joint which permits the housing 6 to be slidably attached to the back wall. Other structures may be used to provide a circuitry housing which is slidably attachable to the lamp sleeve. For example, and without limitation, one or more grooves may be provided in the housing or sleeve which mate with a respective one or more mating tongues in the sleeve or housing, respectively.

If desired, two sleeves 20 may be provided, each of which enclosed a length of the elongated lamp 8. In such embodiment, slidably attaching a single housing 6 to the plurality of sleeves 20 using the opposing tongues 108 and 110 of the

housing mated with respective grooves 114 and 116 of the sleeves, provides support of the plurality of sleeves and the elongated lamp enclosed by the sleeves.

In the embodiment of the present invention illustrated in FIGS. 1 and 2, the back wall 26 of the sleeve 20 comprises a channel 118 in the grooved surface 112 which extends from one end of the sleeve to the other end. Channel 118 contains sufficient volume to contain the conductor 74, extending from the ballast 6' to the lead wire 68, and conductor 76, extending from the ballast 6' to the lead wire 70. FIG. 4 illustrates the manner in which a conductor 92, which is similar to conductors 74 and 76, extends within a channel 118', which is similar to channel 118, from the ballast circuit to the lead wire 68. Positioning the conductors 74 and 76 within the channel 118 contributes to the reduction in EMI during operation of the lamp. Such reduction may be further facilitated by providing at least one cover adjacent to back wall 26 to enclose at least a portion of the channel 118. For example, in the embodiment illustrated in FIGS. 1 and 2, two covers 120 and 124 are provided, each of which mates with the grooved surface 112, as illustrated with respect to cover 124 in FIG. 2. In this manner, the cover 124 is slidably attached to back wall 26 by opposing grooves 114 and 116. With reference to FIG. 1, cover 124 extends in channel 118 between the housing 6 and end 126 of sleeve 20, and cover 120 extends in channel 118 between the housing 6 and the end 128 of sleeve 20.

The aperture lamp of the present invention may include one or more end covers. For example, in the embodiment of FIGS. 1 and 2, end covers may be provided which close any or all of the ballast housing 6, the recess 28, the reflector cavity 42, the aperture 36 and lens 50, if desired. For example, in the embodiment illustrated in FIG. 1, end covers 130 are provided for enclosing the ends of the sleeve 20. Each end cover 130

includes a recess 132 which mates, and provides a snap-fit, with the back wall 26 of the sleeve 20 at ends 126 and 128. Each recess 132 is sufficiently deep to enclose the respective lead wires 68 and 70 and the tab 86 in the embodiment illustrated in FIG. 4. To this end, it will be noted that sleeve 20' has a configuration which is similar to sleeve 20 as illustrated in FIG. 2 with the exception that sleeve 20' includes the tab 86 and prong-like connector 88. If desired, end covers may be provided for one or both ends of the ballast housing illustrated in FIG. 1. If both ends of the housing 6 are enclosed, it will be necessary to provide a manner in which the conductors can extend to the power source and to any grounding external of the ballast housing, if required. One manner of accomplishing this is to provide apertures through one or more of the housing end covers through which the appropriate conductors can be extended. For example, in the embodiment illustrated in FIG. 1, end covers 132 and 134 are provided, end cover 132 having openings therethrugh (not shown) through which the conductors 78 and 80 extend. In such embodiment, all of the end covers, can be configured to provide a tight fit with the sleeves and the housing, as the case may be, to provide a water tight seal for the aperture lamp assembly. In the embodiment illustrated in FIG. 4, only one end 136 of the ballast housing 6" is provided with an end cover 138 to enclose end 136. End cover 138 includes a protuberance 140 which mates, and provides a snap-fit, with the inner surface 142 of the housing 6 at end 136. The opposite end 144 of the housing 6 is open, and the conductors 82 and 84 extend through such open end to the power source 72. The end covers may be fabricated from a resin material in a conventional manner such as, for example, by injection molding.

Although sleeve 20 is extruded from metal, as noted above the present invention is not so limited. For example, applicant has found that the efficiency of a lamp made in accordance with the present invention may be improved by

fabricating sleeve 20 from resin, as, for example, by a conventional extrusion process. For example, applicant believes that to the extent that there is reduced efficiency of light output from a lamp which includes a metal sleeve which conducts the electricity to one of the lamp lead wires as illustrated in FIG. 4, such reduction is due to the capacitive coupling of the fields in the tube with those in the metal rather than the resistance of the metal. Such capacitive coupling is not as evident when the sleeve which provides the lamp housing is moved away from the lamp envelope surface or otherwise does not surround the envelope. FIG. 5 illustrates a cross section of a sleeve 146 which is formed from a plastic material. In this embodiment, the interior surface 148 of the reflector cavity 150 and the recess 152 which encloses the elongated lamp 8 in the manner illustrated in FIG. 1 regarding sleeve 20, may be metallized or otherwise treated as partially shown at 154 to provide the desired reflectivity. The exterior surface 156 may also be metallized as partially shown at 158 to ground the lamp for EMI protection. In the embodiment of FIG. 5, a fine or very small wire (or wires) 160 may extend along the length of the sleeve 146 to supply power to the lamp lead wires from a power source (not shown). Such wire(s) 160 may extend in an elongated channel 162 in the sleeve 146, channel 160 being similar to channel 118. Elongated covers 164 (only one being illustrated) may be provided which slide into place and enclose channel 162 and the wire(s) 160 and thereby contribute to the reduction in EMI. In this embodiment, the wire(s) 160 do not tend to cause significant tube dimming, there being very little capacitive effect between the relatively small wire and the lamp. In the embodiment illustrated in FIG. 5, the thickness of the plastic wall 166 should be great enough to prevent high voltage breakdown between the power leads of the lamp and the ground plane of the lamp due to the greater electrical resistance of the plastic resin material. This potential for electrical breakdown of the plastic resin wall is particularly true when power is supplied,

and the lamp housing has a relatively higher electrical resistance. It will be apparent to those skilled in the art that the mechanical and construction cost convenience of using a metal lamp housing will need to be balanced against the need for a more efficient lamp which can be obtained using the plastic resin lamp housing embodiment. In considering the embodiment illustrated in FIG. 5, a lens 168 may be provided. The lens may be attached to the sleeve, or formed with the sleeve as a single one piece seamless structure. The embodiment of FIGS. 1 and 2 illustrate one manner of attachment of the lens to the sleeve. One manner of forming the sleeve and lens as a single seamless piece is to extrude the plastic sleeve and lens as a whole seamless unit.

In the embodiment illustrated in FIG. 6, a lamp housing is provided which includes a lamp cavity, lens and circuitry housing formed as a single one piece seamless structure, as for example, by extrusion. FIG. 6 illustrates a lamp housing 200 for use with an elongated lamp 202 having an envelope 204 having an outer surface 206. Lamp 202 is energized by circuitry (not shown) electrically connected to the lamp in a manner which may be similar to that illustrated in, for example, FIG. 1. Lamp housing 200 comprises a plastic sleeve 210 extending in the direction 212 of an axis 214 from end 216 to end 218. The sleeve 210 is a single piece of seamless plastic comprising a front wall 220, a rear wall 222, a lens 224 and a chamber 226 for housing circuitry. The front wall 220 comprises a recess 228 extending in direction 212 from end 216 of the sleeve to end 218. Recess 228 is defined by a recessed surface 236 which is substantially conformal to the outer surface 206 of the lamp envelope 204 to enclose the lamp. Front wall 220 also comprises a slot 238 which is adjacent the recess 228 and extends in direction 212. Slot 238 has a width 240 sufficient to emit light from the elongated lamp 202. The lens 224 extends in direction 212 from end 232 to end 234. Lens 224 is positioned in alignment with slot 238 such that

light emitted from the slot will pass through the lens. Chamber 226 is defined by a chamber wall 242 and has sufficient volume to contain the circuitry. In the embodiment illustrated in FIG. 6, the front wall 220 and/or the back wall 222 may be metallized if desired. In the embodiment illustrated in FIG. 6, only the front wall 220 has been metallized. The lamp housing 200 comprises an aperture 244 positioned between the slot 238 and the lens 224. The surface 246 of aperture 244 includes the metallized surface partially shown at 248, the surface 246 being positioned within the sleeve 210 so that when metallized the surface reflects light emitted from the slot 238 through the lens 224. In the embodiment illustrated in FIG. 6, the sleeve 210 comprises a channel 250, similar to channel 118, for containing conductors (not shown) electrically and mechanically connected between the circuitry and lamp 202.

In the embodiment of the type illustrated in FIG. 6, the lamp housing 200 may be extruded from a single plastic resin in which case the resin would need to be clear so that light can be projected through the lens 224. If two or more plastic resin extrusion is performed, only the lens 224 would need to comprise resin which is clear. In either case, the clear plastic resin portions may be colored, for example red, to assist the final projected beam color. The lens may be formed to provide vertical spread of the projected light. For some lamps, such as stop or signal lamps designed to project light in a horizontal plane, the fact that there is no adjustment to the horizontal spread in the co-extrude lens is of no consequence. The interior surface of the lamp housing may be improved. For example, the front wall 222 may metallized as discussed above for improved reflectivity. Alternatively, front wall 222 may be argent painted or otherwise surface treated to provide the desired improved surface finish. In treating the front wall 222, prior to insertion of lamp 202, an elongated shield 252 may be temporarily inserted within the interior cavity of the sleeve 210 adjacent the lens 224 to

protect the interior face of the lens during interior surface treating. Upon completion of such treatment, the shield 252 may be removed, and the lamp 202 inserted. If the exterior surface of the sleeve 210 is metallized to ground the lamp for EMI protection, the exterior lens surface may be masked to preserve the clarity of the lens. Although it is easier to fabricate straight lamps and extruded lamp housings, it is possible to fabricate curved lamps and lamp housings having the same curvature, such as the lamp illustrated in FIG. 3.

The embodiments which have been described herein are but some of several which utilize this invention and are set forth here by way of illustration but not of limitation. It is apparent that many other embodiments which will be readily apparent to those skilled in the art may be made without departing materially from the spirit and scope of this invention.

CLAIMS

What is claimed is:

1. An aperture lamp assembly, comprising:

a lamp having an axis extending in a direction, said lamp comprising an envelope extending in said direction from a first end to an opposite second end;

a first electrode connection extending from said first end and a second electrode connection extending from said second end;

at least one sleeve comprising a front wall and a back wall, said front wall enclosing at least a portion of said envelope and having a slot extending in said direction, said slot having a width sufficient to emit light therethrough from said lamp;

a housing slidably attached to said back wall; and

circuitry contained within said housing electrically connected to said lamp and electrically connectable to a power source.

2. The aperture lamp assembly of claim 1 wherein at least one of said at least one sleeve and said housing is a plastic material.

3. The aperture lamp assembly of claim 2 wherein at least a portion of at least one of said front wall and said back wall is metallized.

4. The aperture lamp assembly of claim 2 wherein said at least one sleeve further includes a lens, said lens being positioned relative to said slot such that light emitted through said slot from said lamp will pass through said lens.

5. The aperture lamp assembly of claim 4 wherein said lens is adapted to be conformal with an interior surface of a window of a vehicle.

6. The aperture lamp assembly of claim 4 wherein said lens is slidably attached to said front wall.

7. The aperture lamp assembly of claim 1 including a first conductor extending between, and being electrically and mechanically connected to, said circuitry and said first electrode, and in second conductor extending between, and being electrically and mechanically connected to, said circuitry and said second electrode, said back wall comprising a channel and said first and second conductors extending from said circuitry to a respective first electrode and second electrode in said channel.

8. The aperture lamp assembly of claim 7 further comprising at least one cover, said cover being slidably attached to said back wall adjacent to and enclosing a portion of said channel.

9. The aperture lamp assembly of claim 1 wherein said envelope is substantially cylindrical having an outer lamp diameter, and said front wall comprises an elongated recess having a substantially cylindrical inner wall having an inner diameter, said recess enclosing said envelope, and said inner diameter being slightly greater than said outer lamp diameter.

10. The aperture lamp assembly of claim 1 wherein at least one of said at least one sleeve and said housing are metal.

11. The aperture lamp assembly of claim 10 wherein said

at least one sleeve is an extruded metal tube with a specular interior surface.

12. The aperture lamp assembly of claim 11 wherein one of said back wall and said housing comprises a tongued surface, and the other of said back wall and said housing comprises a mating grooved surface, whereby a tongue and groove joint is provided to slidably attach said housing to said back wall.

13. The aperture lamp assembly of claim 11 wherein said at least one sleeve further includes a lens attached to said front wall and being positioned relative to said slot such that light emitted through said slot from said lamp will pass through said lens.

14. The aperture lamp assembly of claim 13 wherein one of said front wall and said lens comprises a tongued surface, and the other of said front wall and said lens comprises a mating grooved surface, whereby a tongue and groove joint is provided to slidably attach said lens to said front wall.

15. The aperture lamp assembly of claim 11 wherein said circuitry comprises a ballast circuit and said lamp comprises a discharge lamp.

16. The aperture lamp assembly of claim 11 wherein said at least one sleeve includes a tab extending therefrom, said tab being electrically and mechanically connected to said first electrical connection, and further including a conductor extending between, and electrically and mechanically connected to, said second electrode connection and said circuitry, and said at least one sleeve comprises an electrical connector, said electrical connector being electrically and mechanically connected to

said circuitry, whereby electricity is conductible (a) by said conductor from said circuitry to said second electrode connection and (b) by said at least one sleeve from said circuitry to said first electrode connection.

17. The aperture lamp assembly of claim 12 wherein said back wall comprises said grooved surface and a channel in said grooved surface, and said housing comprises said tongued surface, and further including a first conductor extending between, and electrically and mechanically connected to, said circuitry and said first electrode, and a second conductor extending between, and being electrically and mechanically connected to, said circuitry and said second electrode, said first and second conductors extending from said circuitry to a respective first electrode and second electrode in said channel.

18. The aperture lamp assembly of claim 17 further comprising at least one cover, said cover being slidably attached to said back wall by said grooved surface and being positioned adjacent to and enclosing a portion of said channel.

19. The aperture lamp assembly of claim 13 wherein said lens is adapted to be conformal with an interior surface of a window of a vehicle.

20. A lamp housing for use with an elongated lamp of the type having an envelope having an outer surface and energized by circuitry electrically connected to the elongated lamp, comprising:

a sleeve, having a front wall and a back wall, and extending in the direction of an axis from a first end to a second end; said front wall comprising a recess defined by a recessed surface, said recessed surface being sufficiently conformal with at least a portion of the

outer surface to enclose the portion, said front wall having an opening opposite and aligned with said recess and extending in said direction, said recess having a slot extending in said direction, said slot having a width sufficient to emit light from said elongated lamp and a length sufficiently aligned with said opening to project the light through said opening; and

a housing slidably attachable to said back wall and comprising a chamber defined by an inner housing surface, said chamber having sufficient volume to contain the circuitry.

21. The lamp housing of claim 20 wherein said envelope is substantially cylindrical having an outer lamp diameter, and said recess having a substantially cylindrical inner wall having an inner diameter, said inner diameter being slightly greater than said outside lamp diameter.

22. The lamp housing of claim 20 wherein said sleeve is an extruded metal tube with a specular interior surface.

23. The aperture lamp assembly of claim 22 wherein one of said back wall and said housing comprises a tongued surface, and the other of said back wall and said housing comprises a mating grooved surface,whereby a tongue and groove joint is provided to slidably attach said housing to said back wall.

24. The lamp housing of claim 22 wherein said front wall comprises one of a tongued surface and a grooved surface structured and arranged to mate with the other of a tongued surface and a grooved surface of a lens, whereby a tongue and groove joint is provided to slidably attach said lens to said front wall.

25. The lamp housing of claim 23 wherein said back wall

comprises said grooved surface and a channel in said grooved surface, and said housing comprises said tongued surface, said channel extending in said direction and being structured and arranged to contain conductors extending between said circuitry and said lamp.

26. The lamp housing of claim 25 further comprising at least one cover, said cover being slidably attached to said back wall by said grooved surface adjacent to and enclosing a portion of said channel.

27. A lamp housing for use with an elongated lamp of the type having an envelope having an outer surface and energized by circuitry electrically connected to the elongated lamp, comprising: a plastic sleeve extending in the direction of an axis from a first end to a second end, said sleeve being a single piece of seamless plastic and comprising:

a front wall and a rear wall, said front wall comprising (a) a recess extending in said direction and being defined by a recessed surface, said recessed surface being sufficiently conformal with said outer surface to enclose said elongated lamp, and (b) a slot adjacent said recess and extending in said direction, said slot having a width sufficient to emit light from said elongated lamp;

a lens extending in said direction and positioned relative to said slot such that light emitted from said slot will pass through said lens; and

a chamber defined by a chamber wall and having sufficient volume to contain said circuitry.

28. The aperture lamp assembly of claim 27 wherein at least a portion of at least one of said front wall and said back wall is metallized.

29. The lamp housing of claim 28 wherein said front wall

further comprises an aperture positioned between said slot and said lens, said aperture including a metallized surface, said metalized surface being positioned to reflect light emitted from said slot through said lens.

30. The lamp housing of claim 29 wherein said sleeve comprises a channel structured and arranged to contain conductors electrically and mechanically connected between said circuitry and said lamp.

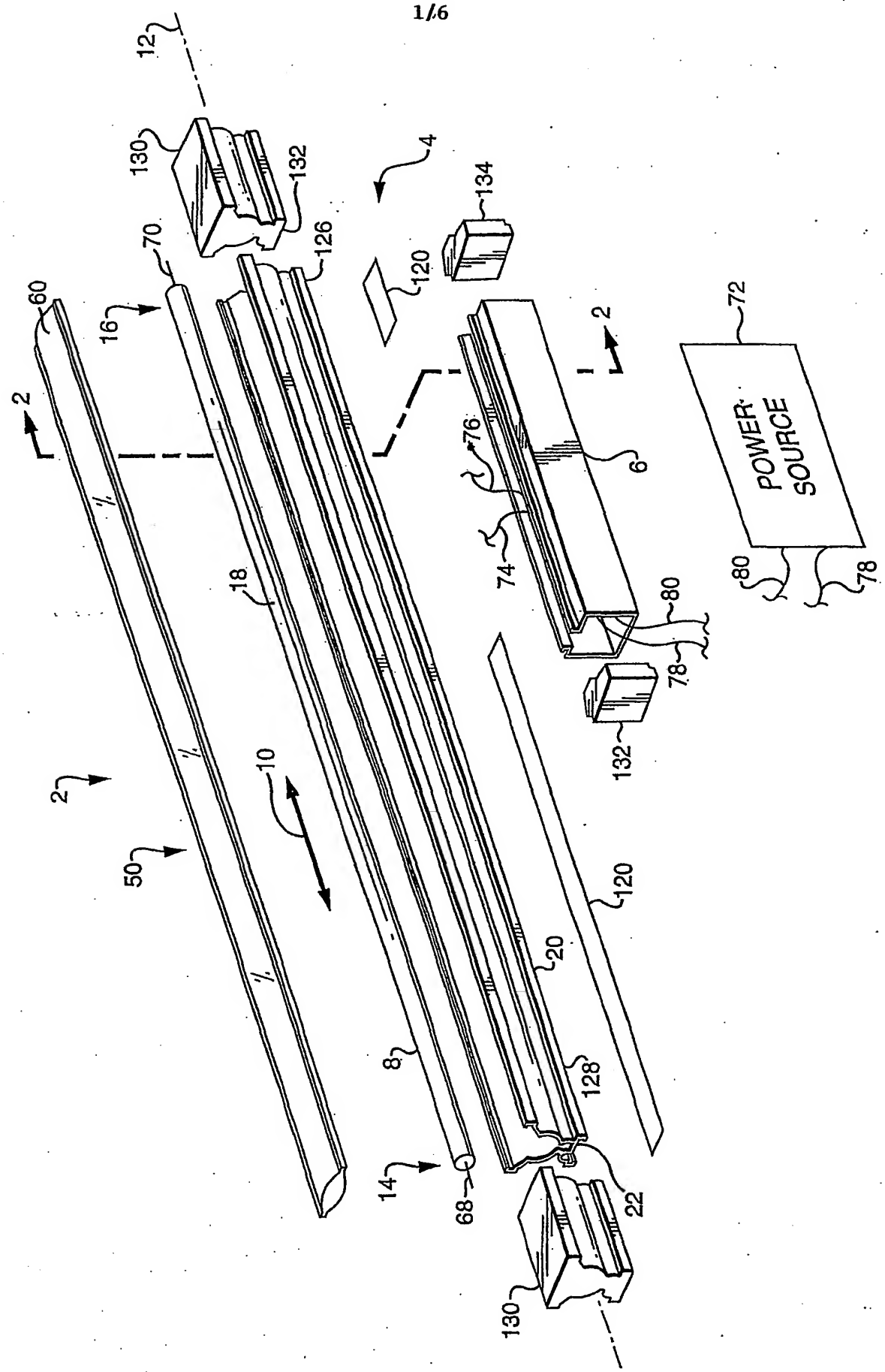

FIG. 1

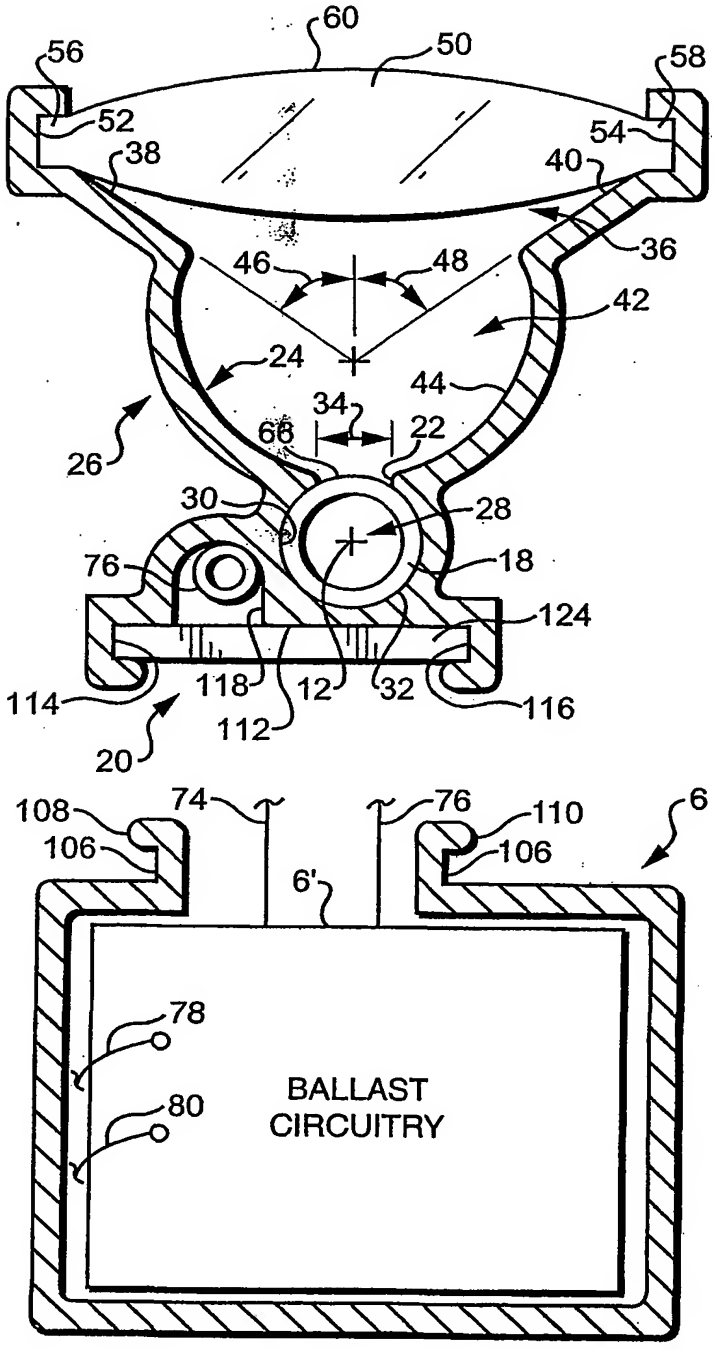

FIG. 2

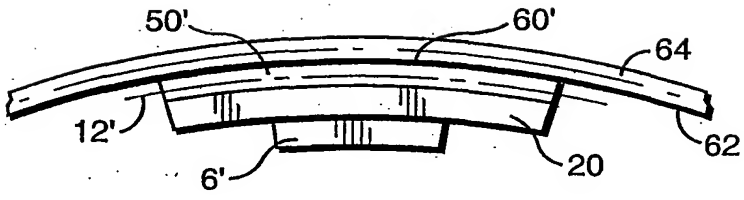

FIG. 3

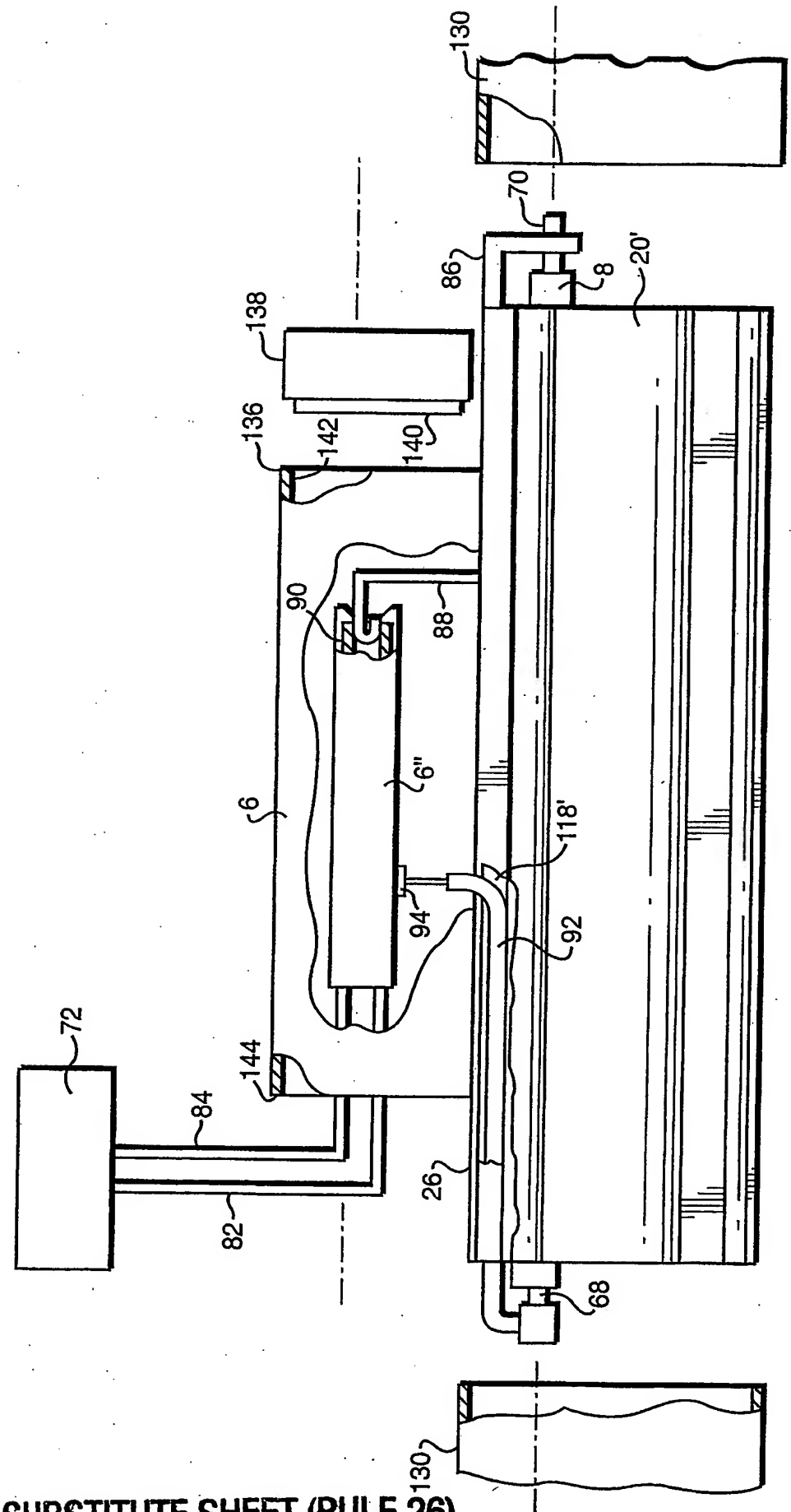

FIG. 4

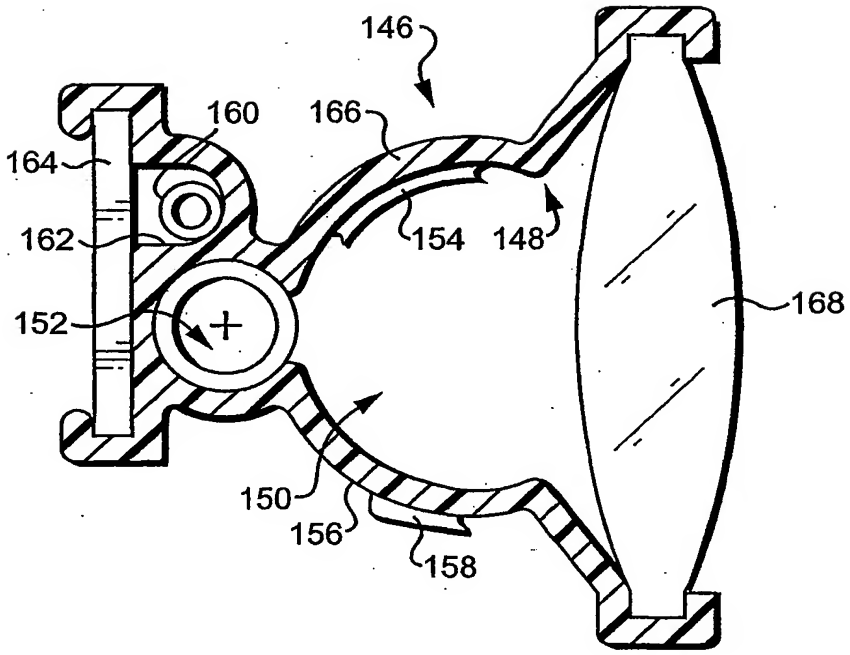

FIG. 5

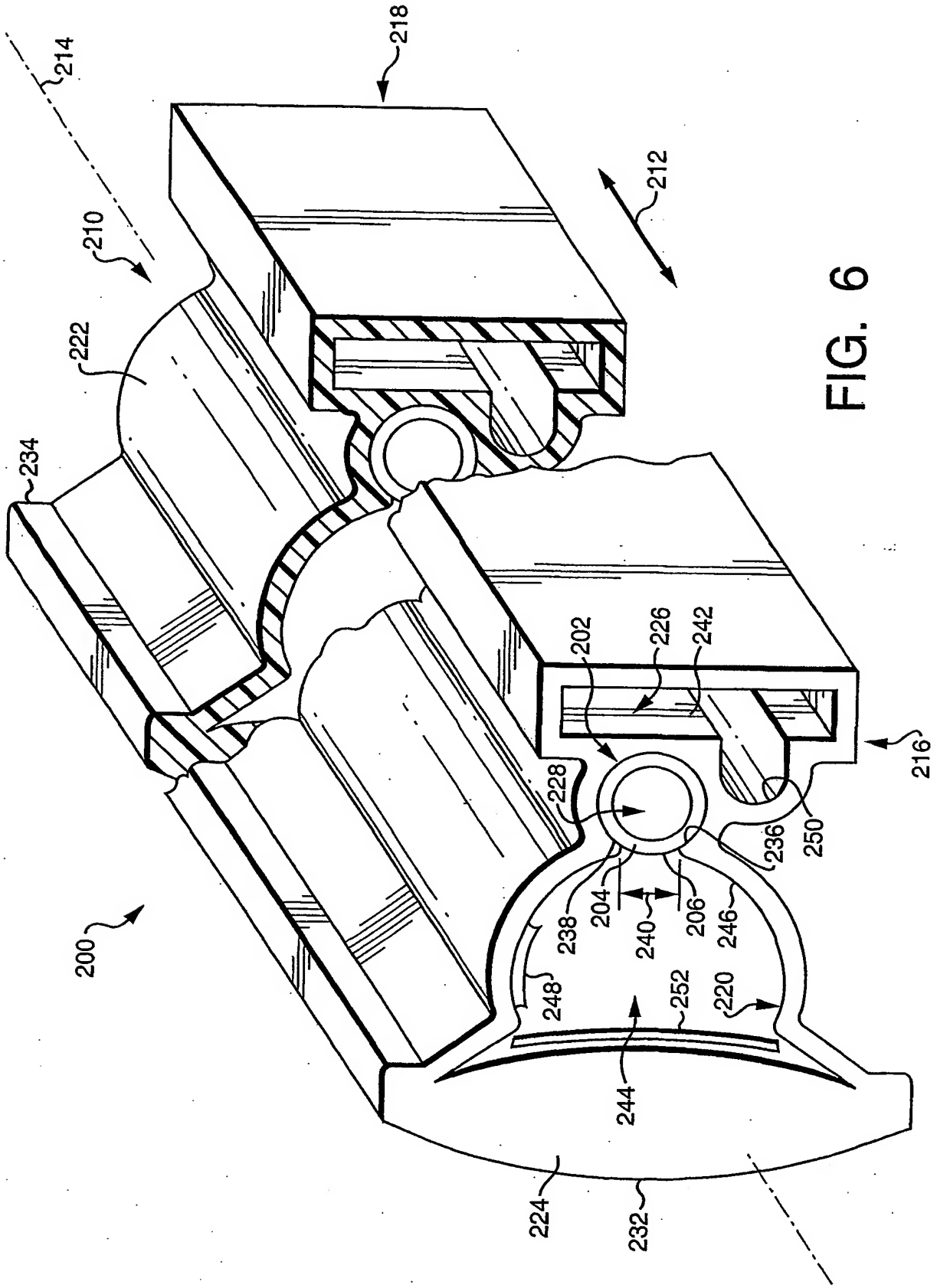

FIG. 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US01/23594

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : F21S 8/00
US CL : 362/217, 221, 223, 222, 224, 260

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
U.S. : 362/217, 221, 223, 222, 224, 260

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
NONE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 6,048,075 A (LAI) 11 April 2000 (11.04.2000), Abstract; column 2, lines 26-67; and column 3, lines 40-46.	1, 3, 7, 8
—		—
A		2, 4-6, 9-30

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:

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18 November 2001 (18.11.2001)

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